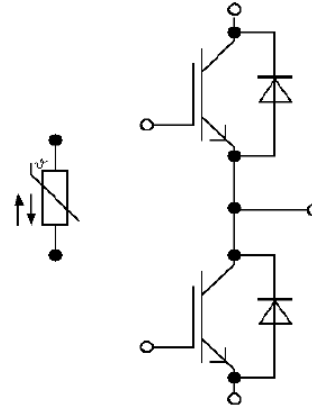


Econo Dual module with Trench/Fieldstop IGBT and Fast recovery diode and NTC



**Product Data**

VCES	IC @100°C	VCE(sat) @25°C	VF @25°C	Package
1200 V	450 A	1.65 V	2.0 V	M

**Features**

- Low Switching loss
- Low  $V_{CEsat}$
- $V_{CEsat}$  with positive Temperature Coefficient
- High Power Density

**Typical Applications**

- Motor/ Servo Drives
- High Power Converters
- UPS Systems
- Wind Turbines

**IGBT / Maximum Rated Values**

Parameter	Condition	Symbol	Value	United
Collector-emitter Voltage	$T_{vj}=25^{\circ}C$	$V_{CES}$	1200	V
Continuous DC Collector Current	$T_C=100^{\circ}C, T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	450	A
Repetitive Peak Collector Current	$T_P=1ms$	$I_{CRM}$	900	A
Total Power Dissipation	$T_C=25^{\circ}C, T_{vj\ max}=175^{\circ}C$	$P_{tot}$	2265	W
Gate-emitter Peak Voltage		$V_{GES}$	$\pm 20$	V

**Diode / Maximum Rated Values**

Parameter	Conditions	Symbol	Value	United
Repetitive Peak Reverse Voltage	$T_{vj}=25^{\circ}C$	$V_{RRM}$	1200	V
Continuous DC Forward Current		$I_F$	450	A
Repetitive Peak Forward Current	$T_P=1ms$	$I_{FRM}$	900	A

**IGBT / Characteristic Values**

Parameter	Conditions	Symbol	Min.	Typ.	Max.	United
Collector-emitter Saturation Voltage	$I_C = 450\text{ A}, V_{GE} = 15\text{ V}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$V_{CE\text{ sat}}$		1.65	1.95	V
	$I_C = 450\text{ A}, V_{GE} = 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			1.85		V
	$I_C = 450\text{ A}, V_{GE} = 15\text{ V}$ $T_{vj} = 150\text{ }^\circ\text{C}$			1.90		V
Gate Threshold Voltage	$I_C = 17.1\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25\text{ }^\circ\text{C}$	$V_{GEth}$	5	5.6	6.8	V
Internal Gate Resistor	$T_{vj} = 25\text{ }^\circ\text{C}$	$R_{Gint}$		1.6		$\Omega$
Input Capacitance	$f = 1\text{ MHz}, T_{vj} = 25\text{ }^\circ\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$	$C_{ies}$		37.8		nF
Reverse Transfer Capacitance	$f = 1\text{ MHz}, T_{vj} = 25\text{ }^\circ\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$	$C_{res}$		1.35		nF
Collector-emitter Cut-off Current	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25\text{ }^\circ\text{C}$	$I_{CES}$			1	mA
Gate-emitter Leakage Current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25\text{ }^\circ\text{C}$	$I_{GES}$			600	nA
Turn-on Delay Time, Inductive Load	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$t_{d\text{ on}}$		160		ns
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			210		ns
	$R_{Gon} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			252		ns
Rise Time, Inductive Load	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$t_r$		36		ns
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			51		ns
	$R_{Gon} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			63		ns
Turn-off Delay Time, Inductive Load	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$t_{d\text{ off}}$		350		ns
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			380		ns
	$R_{Goff} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			435		ns
Fall Time, Inductive Load	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$t_f$		155		ns
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			190		ns
	$R_{Goff} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			225		ns
Turn-on Energy Loss Per Pulse	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}, L_s = 100\text{ nH}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$E_{on}$		7.8		mJ
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			10.2		mJ
	$R_{Gon} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			15.6		mJ
Turn-off Energy Loss Per Pulse	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}, L_s = 100\text{ nH}$ $T_{vj} = 25\text{ }^\circ\text{C}$	$E_{off}$		36.0		mJ
	$V_{GE} = \pm 15\text{ V}$ $T_{vj} = 125\text{ }^\circ\text{C}$			49.5		mJ
	$R_{Goff} = 0.36\text{ }\Omega$ $T_{vj} = 150\text{ }^\circ\text{C}$			58.7		mJ
SC Data	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \text{ di/dt} \quad t_p \leq 10\text{ }\mu\text{s}, T_{vj} = 150\text{ }^\circ\text{C}$	$I_{SC}$		1980		A
Thermal Resistance, Junction to Case	Per IGBT	$R_{thJC}$			0.059	K/W
Thermal Resistance, Case to Heatsink	Per IGBT $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$	$R_{thCH}$		0.028		K/W
Temperature Under Switching Conditions		$T_{vj\text{ op}}$	-40		150	$^\circ\text{C}$

**NTC Characteristic Values**

Parameter	Conditions	Symbol	Min.	Typ.	Max.	United
Rated resistance	$T_C = 25\text{ }^\circ\text{C}$	$R_{25}$		5		k $\Omega$
Power dissipation	$T_C = 25\text{ }^\circ\text{C}$	$P_{25}$		20		mW
B-value	$R_2 = R_{25} \exp [B_{25/50} (1/T_2 - 1/(298,15\text{ K}))]$			3375		K

FRD / Characteristic Values

Parameter	Conditions	Symbol	Min.	Typ.	Max.	United
Forward Voltage	$I_F = 450 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 25 \text{ }^\circ\text{C}$	$V_F$		2.0	2.4	V
	$I_F = 450 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 125 \text{ }^\circ\text{C}$			1.7		V
	$I_F = 450 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 150 \text{ }^\circ\text{C}$			1.6		V
Peak Reverse Recovery Current	$I_F = 450 \text{ A}$ $T_{vj} = 25 \text{ }^\circ\text{C}$	$I_{RM}$		450		A
	$V_R = 600 \text{ V}$ $T_{vj} = 125 \text{ }^\circ\text{C}$			550		A
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150 \text{ }^\circ\text{C}$			580		A
Recovered Charge	$I_F = 450 \text{ A}$ $T_{vj} = 25 \text{ }^\circ\text{C}$	$Q_r$		52		$\mu\text{C}$
	$V_R = 600 \text{ V}$ $T_{vj} = 125 \text{ }^\circ\text{C}$			95		$\mu\text{C}$
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150 \text{ }^\circ\text{C}$			112		$\mu\text{C}$
Reverse Recovery Energy	$I_F = 450 \text{ A}$ $T_{vj} = 25 \text{ }^\circ\text{C}$	$E_{rec}$		25.8		mJ
	$V_R = 600 \text{ V}$ $T_{vj} = 125 \text{ }^\circ\text{C}$			43.6		mJ
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150 \text{ }^\circ\text{C}$			53.8		mJ
Thermal Resistance, Junction to Case	Per diode	$R_{thJC}$			0.08	K/W
Thermal Resistance, Case to Heatsink	Per diode $\lambda_{paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	$R_{thCH}$		0.040		K/W
Temperature Under Switching Conditions		$T_{vj\ op}$	-40		150	$^\circ\text{C}$

Module

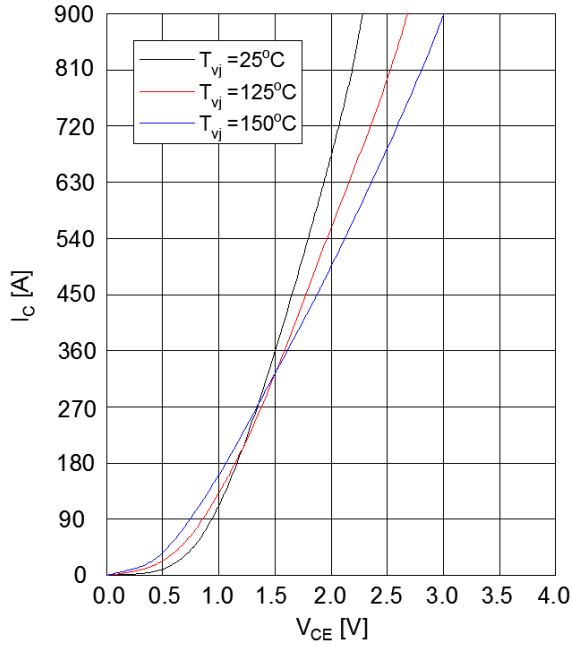
Parameter	Conditions	Symbol	value	United
Isolation Test Voltage	RMS, $f = 50 \text{ Hz}, t = 1 \text{ min.}$	$V_{ISOL}$	4.0	kV
Material of Module Baseplate			Cu	
Internal Isolation	Basic insulation (class 1, IEC 61140)		$\text{Al}_2\text{O}_3$	
Creepage Distance	Terminal to heatsink		14.5	mm
	Terminal to terminal		13.0	
Clearance	Terminal to heatsink		13.0	mm
	Terminal to terminal		10.5	
Comperative Tracking Index		CTI	>200	

Parameter	Conditions	Symbol	Min.	Typ.	Max.	United
Thermal Resistance, Case to Heatsink	Per module $\lambda_{paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	$R_{thCH}$		0.009		K/W
Stray Inductance Module		$L_{sCE}$		20		nH
Module Lead Resistance, Terminals- chip	$T_C = 25^\circ\text{C}$ , Per switch	$R_{CC+EE}$		0.99		m $\Omega$
Storage Temperature		$T_{stg}$	-40		125	$^\circ\text{C}$
Mounting Torque for Modul Mounting	Screw M6-mounting according to valid application note	M	3.00		6.00	Nm
Terminal Connection Torque	Screw M6-mounting according to valid application note	M	3.00		6.00	Nm
Weight		G		350		g

输出特性 IGBT, 逆变器 (典型)

$I_C = f(V_{CE})$

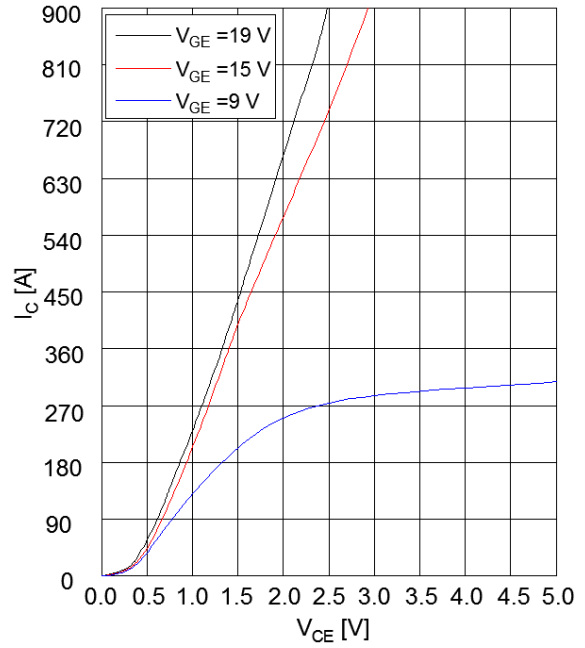
$V_{GE} = 15\text{ V}$



输出特性 IGBT, 逆变器 (典型)

$I_C = f(V_{CE})$

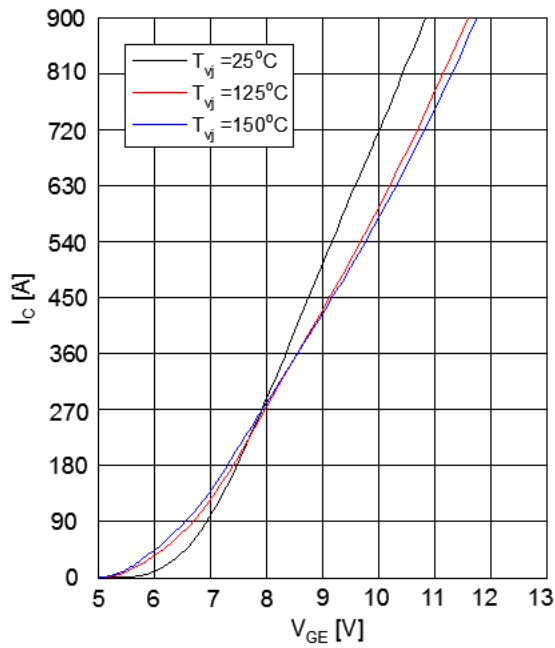
$T_{vj} = 25^\circ\text{C}$



传输特性 IGBT, 逆变器 (典型)

$I_C = f(V_{GE})$

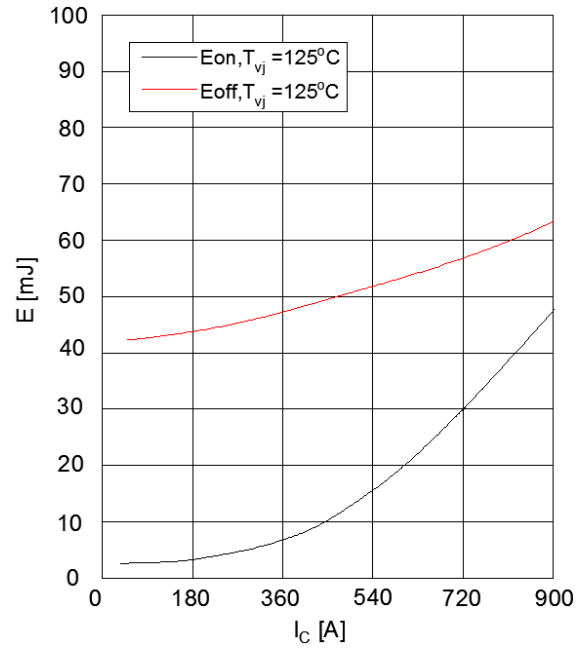
$V_{CE} = 20\text{ V}$



开关损耗 IGBT, 逆变器 (典型)

$E_{on} = f(I_C), E_{off} = f(I_C)$

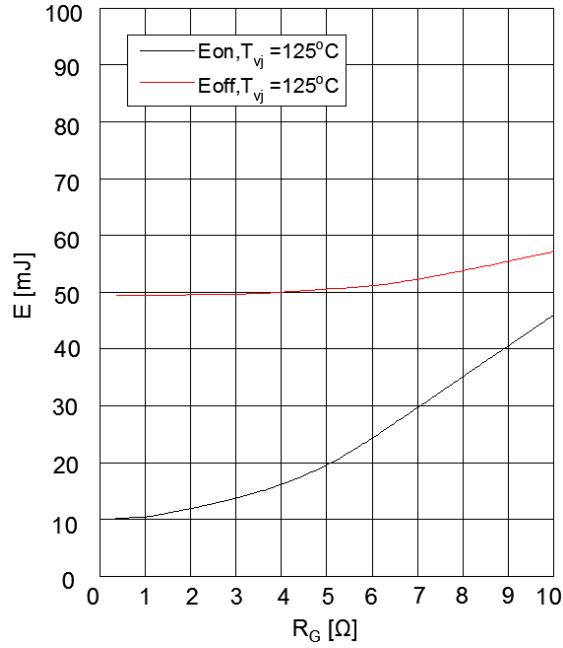
$V_{GE} = \pm 15\text{ V}, R_{Gon} = 0.36\ \Omega, R_{Goff} = 0.36\ \Omega, V_{CE} = 600\text{ V}$



开关损耗 IGBT, 逆变器 (典型)

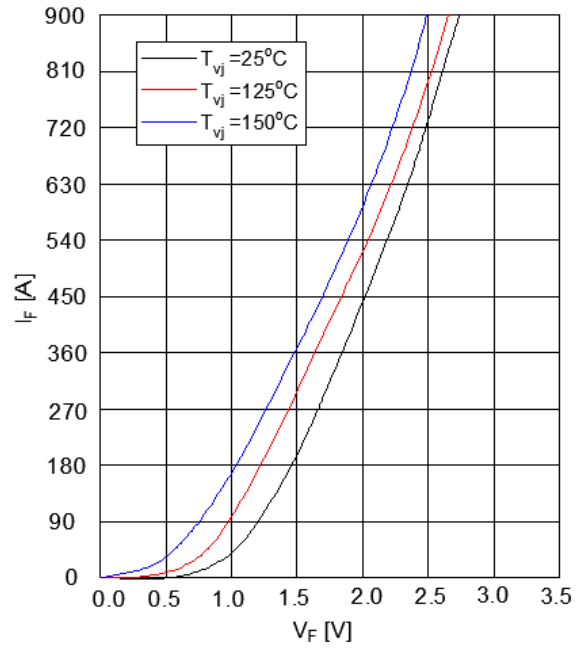
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$V_{GE} = \pm 15\text{ V}, I_C = 450\text{ A}, V_{CE} = 600\text{ V}$



正向偏压特性 二极管, 逆变器 (典型)

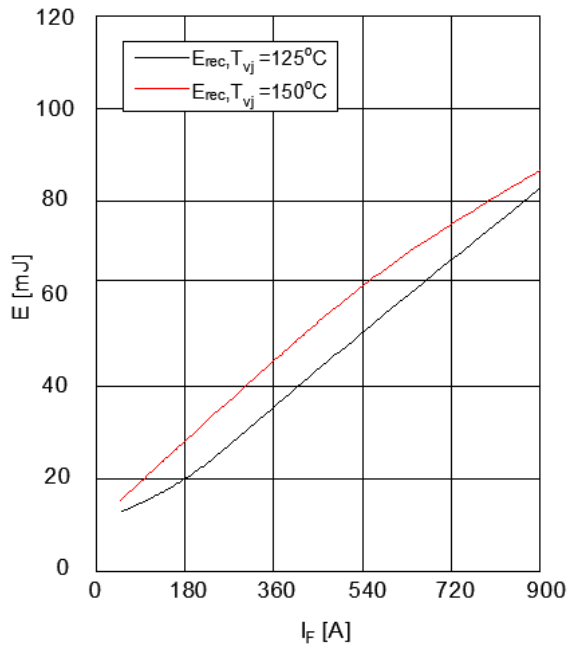
$$I_F = f(V_F)$$



开关损耗 二极管, 逆变器 (典型)

$$E_{rec} = f(I_F)$$

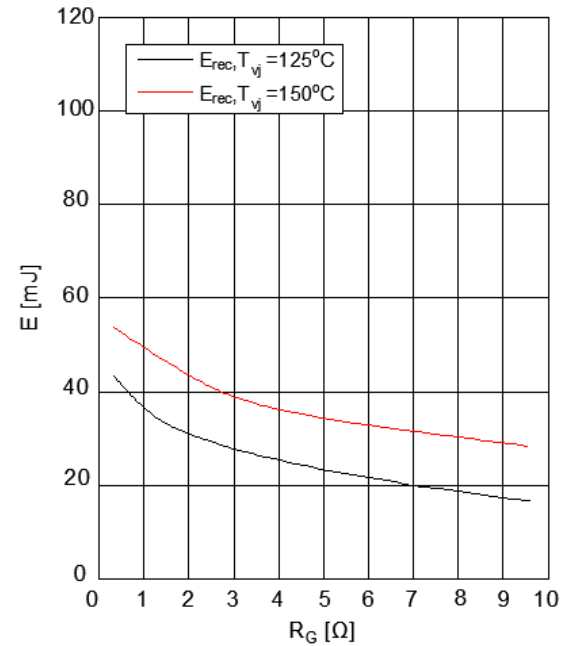
$R_{Gon} = 0.36\ \Omega, V_{CE} = 600\text{ V}$



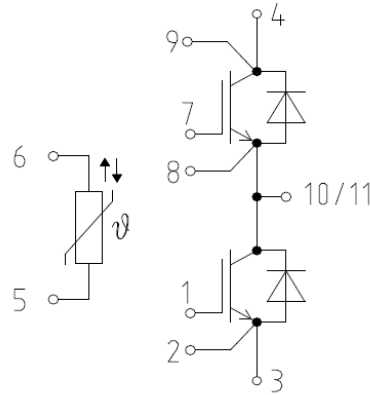
开关损耗 二极管, 逆变器 (典型)

$$E_{rec} = f(R_G)$$

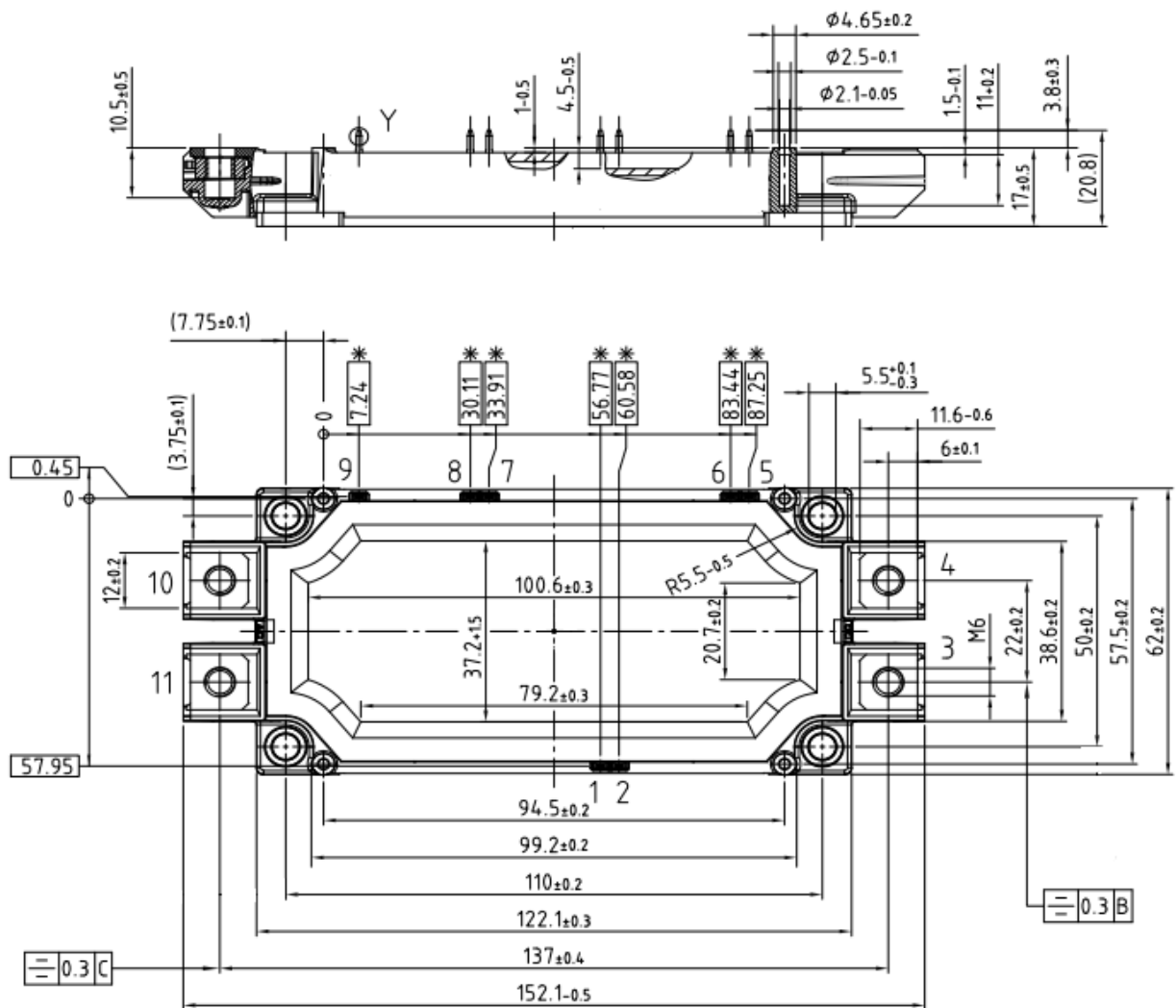
$R_{Gon} = 0.36\ \Omega, V_{CE} = 600\text{ V}$



Circuit diagram headline



Package outlines



### Terms of usage

Product specification contains the essential data and applied range. Technicians will have to evaluate product data and use product correctly.

All information in specification is true and guaranteed. If you have any requirements about product data beyond the specification or any doubts about our product, please contact the sales office, which is responsible for you ([market@yttaixin.com](mailto:market@yttaixin.com)).

Our product is prohibited from applying in illegal criminal activity which undermined health and national interest.